

ANNUAL REPORT 1965

STREETSVILLE

water pollution control plant

LIBRARY COPY

JUN 28 1966

ONTARIO WATER
RESOURCES COMMISSION

DIVISION OF PLANT OPERATIONS

Ontario Water Resources Commission

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ONTARIO WATER RESOURCES COMMISSION
OFFICE OF THE GENERAL MANAGER

Members of the Streetsville Local Advisory Committee,
Town of Streetsville.

Gentlemen:

I am pleased to provide you with the 1965 Annual Report for the Water Pollution Control Plant, OWRC Project No. 57-S-5.

We appreciate the co-operation you have extended to our Operations staff throughout the year, and trust that continuation of this close association will ensure even greater progress in the sphere of water pollution control.

Yours very truly,

A handwritten signature in dark ink, appearing to read "D. S. Caverly".

D. S. Caverly,
General Manager.



ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET

TORONTO 5

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J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER

W. S. MACDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am pleased to provide you with the 1965 Annual Report on the operation of the Streetsville Water Pollution Control Plant, OWRC Project No. 57-S-5.

The report presents design data, outlines operating problems encountered during the year and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

A handwritten signature in cursive script, appearing to read "B. C. Palmer".

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

This report provides useful information on the operating efficiency of this project during 1965. It is intended to act as a guide in gauging plant performance. To implement that aim, it includes detailed statistical and cost data, a description of the project and a summary of its operation during the year.

Of particular interest will be the cost data, which show the total cost to the municipality and the areas of major expenditure.

The Regional Operations Engineer is primarily responsible for the preparation of the report, and has compiled and arranged the material. He will be pleased to answer any questions regarding it. Other groups, however, were involved in the production, and these include the statistics section, the Drafting Section of the Division of Sanitary Engineering and the Division of Finance.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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STREETSVILLE water pollution control plant

operated for

THE TOWN OF STREETSVILLE

by the

ONTARIO WATER RESOURCES COMMISSION

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VICE-CHAIRMAN: J. H. H. Root, M.P.P.

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F. A. Voegel	A. K. Watt

COMMISSION SECRETARY

W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

DIRECTOR: B. C. Palmer

Assistant Director:	C. W. Perry
Regional Supervisor:	A. C. Beattie
Operations Engineer:	A. Clark

801 Bay Street	Toronto 5
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'65 REVIEW

A total of 200.1 million gallons were treated. This is an average daily flow of 0.55 million gallons.

Flows are increasing steadily each year. The probability of flow graph shows that the plant was hydraulically overloaded 5 percent of the time.

Although the overall cost of treatment was increased in 1965, the cost per million gallons treated was reduced by \$8.60.

There were seasonal problems caused by the canning factories in town.

The quality of effluent was very good and generally was within OWRC objectives of 15 ppm BOD and SS.

GLOSSARY

BOD	biochemical oxygen demand (a measure of organic content)
cfm	cubic feet per minute
comminution	shredding of solids into small fragments
DWF	dry weather flow
effluent	outflow
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
grit	sand, dust, stones, cinders and other heavy inorganic material
influent	inflow
lin. ft.	lineal feet
mgd	million gallons per day
mlss	mixed liquor suspended solids
ppm	parts per million
ss	suspended solids
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)

HISTORY

1956 - 1964

In 1956 the Village of Streetsville and the Ontario Water Resources Commission initiated plans for the construction of a modern water pollution control plant. The firm of Proctor and Redfern Limited of Toronto, Ontario, was engaged to prepare plans and specifications for the project.

APPROVAL

On December 6th, 1957, the municipality signed an agreement with the Ontario Water Resources Commission to finance, construct and operate a water pollution control plant.

CONSTRUCTION

Tret Construction Company was awarded the contract and the project was started November 12th, 1957 and completed November 13th, 1958. The official opening was held on June 27th, 1959.

TOTAL COST

The total cost of the project was \$310,937.98.



Project Staff

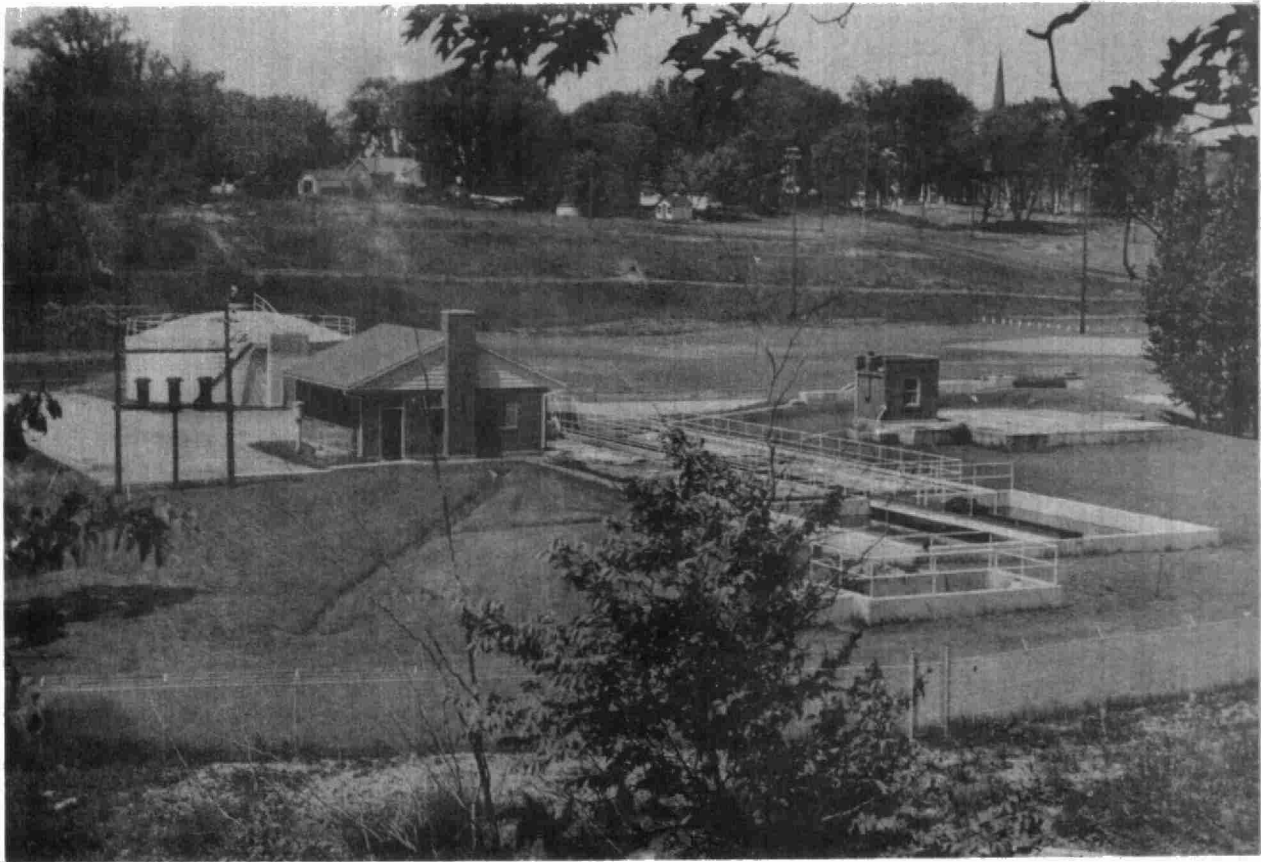
R. DADD
CHIEF OPERATOR

COMMENTS

The Chief Operator of the plant is Richard Dadd. Mr. Dadd has been in charge of the plant since 1959.

He is assisted by a casual labourer, R. Jess.

The plant has been operated to the satisfaction of the Division of Plant Operations.



Description of Project

SEWAGE COLLECTION SYSTEM

The sewage is collected by a system of separate sanitary sewers, including four pumping stations, and enters the treatment plant by gravity through two 12-inch and one 8-inch diameter cast iron inverted siphons.

These inverted siphons discharge to a common manhole at the north side of the plant site which is connected to the influent works by a 14-inch diameter cast iron pipe.

INFLUENT WORKS

The flow entering the influent works may be split, allowing excess flow to be diverted to the old settling tank. From this tank it flows to the chlorine contact chamber where it is chlorinated and then discharged to the Credit River.

For normal flows, however, the sewage passes through one of two manually cleaned bar screens where twigs and rags are removed, then through one of the two manually cleaned grit channels. Both of these channels terminate with a proportional weir which maintains a constant velocity through the grit channels of one foot per second. These channels have been designed to operate one at a time so that the other can be cleaned in readiness for operation.

From the grit channels the sewage passes through a Parshall flume, allowing the sewage entering the plant to be measured.

From the flume, the sewage enters the last chamber of the influent works, into which the 6 inch supernatant line from the digester discharges. The combined raw sewage and supernatant then flows through a 12 inch diameter cast iron pipe

to the influent well of the primary sedimentation tank. This 12-inch C.I. feed line is valved so that the sewage can either pass to the primary tank, by-pass the primary tank going direct to the aeration tanks, or by-pass the plant completely and flow to the chlorination chamber.

PRIMARY SEDIMENTATION

There is one primary sedimentation tank 35 ft. square which retains the sewage for 2.3 hours at design flow. This detention period is sufficient to allow approximately 50% of the suspended solids to settle out to the bottom. There is also a skimming mechanism which conveys surface scum and grease to a scum pit where, together with the sludge settled out in the bottom of the tank, it is pumped to the digester.

AERATION

Settled sewage from the primary tank flows to the aeration section where it is mixed with the activated sludge returned from the final sedimentation tank.

The aeration tank retains the sewage for a period of 6 hours at design flow plus 25% return sludge. This allows the biological environment sufficient time to remove the finely divided, suspended and dissolved organic material remaining in the flow.

The settled sludge (activated sludge) from the final sedimentation tank is recirculated back to the aeration tanks and mixes with the incoming effluent from the primary sedimentation tank.

This mixed liquor is then aerated by air supplied from compressors. The air supplied provides the oxygen requirements of the biological communities of aerobic micro-organisms (mixed liquor sludge floc) and also produces a roll which prevents settling in the tanks. The activated sludge which is returned acts as the vehicle for the bacteria which in turn oxidizes the organic material contained in the sewage.

FINAL SEDIMENTATION

The final sedimentation tank provides a detention period of 2.4 hours which is sufficient to allow the activated sludge to settle out. The activated sludge which is settled out in the final tank is returned to the aeration tanks and provides a continuous environment for the maintenance of floc in the tank. Excess sludge is wasted, being pumped to the digester.

After final settling, the effluent overflows the weir to a chlorine contact chamber where it is chlorinated and then discharged to the Credit River.

DIGESTION

There is a single digester at the Streetsville plant. Sludge from the primary tank is pumped, with excess activated sludge to this tank where, in the absence of air and in a regulated temperature of 90°F., the decomposing or digestion process begins.

The raw sludge when broken down by anaerobic bacterial action and thoroughly digested is a thick dark liquid.

The digested sludge is then disposed of by placing it on the sand drying beds or by truck haulage.

Sludge gas formed during the process is used as fuel for the heat exchanger supplying heat to the digester.

CHLORINATION

The effluent, prior to discharge to the Credit River is chlorinated and retained in a chlorine contact chamber for approximately 20 minutes. Facilities are adequate to supply chlorine at a rate of 200 pounds per 24 hours.

EFFLUENT FILTER

During periods of poor quality final effluent, part of the final effluent can be discharged to a sand filter bed which "polishes" the effluent prior to discharge to the Credit River.

PROJECT COSTS

NET CAPITAL COST (Final)	\$310,937.98
DEDUCT -	
Payments from Municipalities	<u>\$30,000.00</u>
Long Term Debt to OWRC	<u>\$280,937.98</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1965	\$ <u>47,539.76</u>
Net Operating	14,565.95
Debt Retirement	5,669.00
Reserve	1,662.97
Interest Charges	15,762.56
TOTAL	\$ <u>37,660.48</u>

RESERVE ACCOUNT

Balance at January 1, 1965	\$ 17,441.94
Deposited by Municipality	1,662.97
Interest Earned	<u>1,001.06</u>
	\$ 20,105.97
Less Expenditures	(312.00)
Balance at December 31, 1965	\$ <u>19,793.97</u>

MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER
JAN	1024.90	321.96	153.32	70.62	131.72		18.65			320.58	8.05
FEB	823.72	305.76	130.64	58.74	123.91		7.72			188.90	8.05
MARCH	790.00	305.76	129.24		121.72		14.06			215.13	4.09
APRIL	928.11	384.29	114.98	10.94	125.63	46.51	37.14		194.49	11.48	2.65
MAY	1536.10	670.69	340.62	62.40	127.80		10.97	62.99	22.00	235.98	2.65
JUNE	1066.03	352.49	215.68	38.94	119.55	224.03	47.07	10.46		41.03	16.78
JULY	1245.18	354.52	249.74		124.11		38.62	7.11	25.02	422.53	23.53
AUG	1335.04	342.44	203.30	124.64	126.28	46.89	69.59			386.22	35.68
SEPT	976.34	393.78	241.52	76.64	118.66		35.97	58.66		21.28	29.83
OCT	2596.43	561.98	299.48	38.10	121.71	224.03	4.28	10.09	195.31	1113.19	28.26
NOV	959.06	452.38	193.04	21.34	129.10		39.01		58.52	37.86	27.81
DEC	1285.04	557.56		72.14	127.87	141.89	86.74		21.60	252.58	24.66
TOTAL	14565.95	5003.61	2271.56	574.50	1498.06	683.35	409.82	149.31	516.94	3246.76	212.04

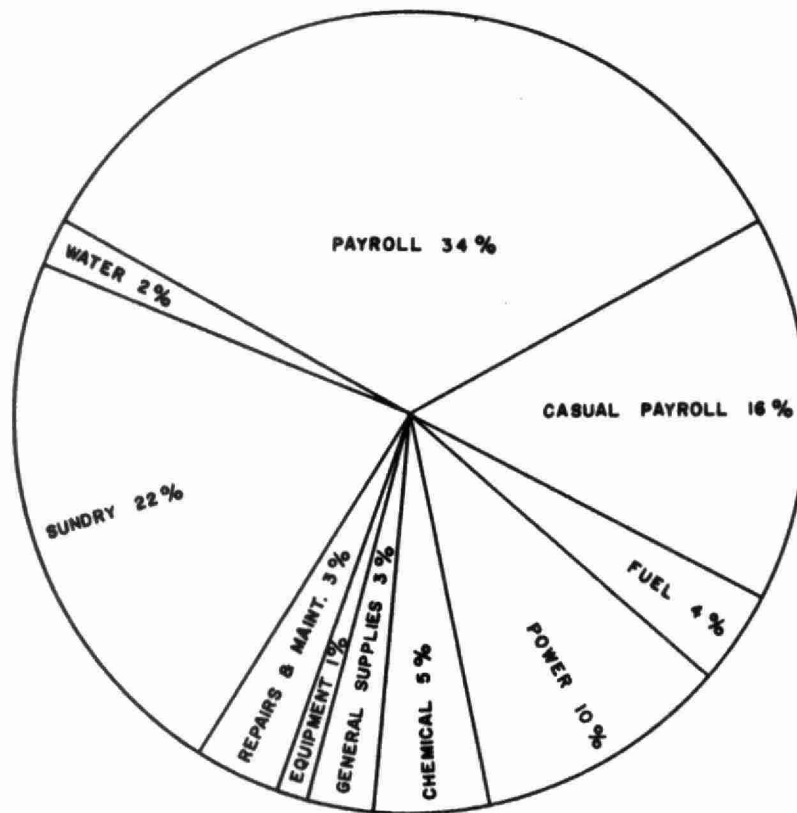
* SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE \$2,551.30
BRACKETS INDICATE CREDIT

YEARLY OPERATING COSTS

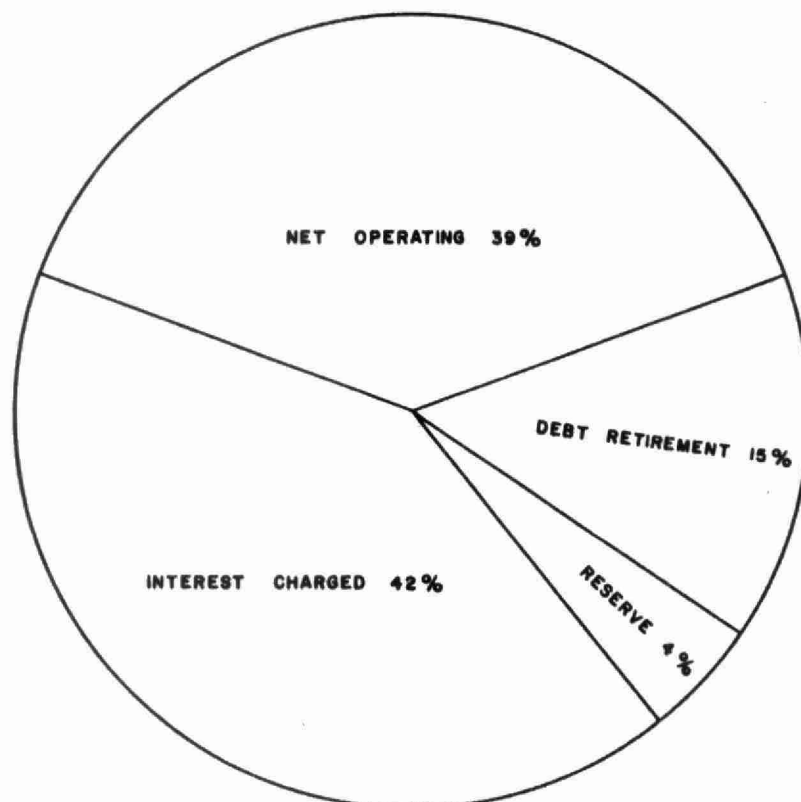
YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER MILLION GALLONS	COST PER L.B. OF BOD REMOVED
1962	148.7	\$ 11416.75	* \$ 8.58	\$ 77.30	2 CENTS
1963	140.6	14297.80	10.45	102.00	2 CENTS
1964	172.3	14024.94	9.59	81.39	3 CENTS
1965	200.1	14565.95	9.98	72.79	2 CENTS

* BASED ON ANNUAL POPULATION ESTIMATE AND 3.9 PERSONS PER FAMILY

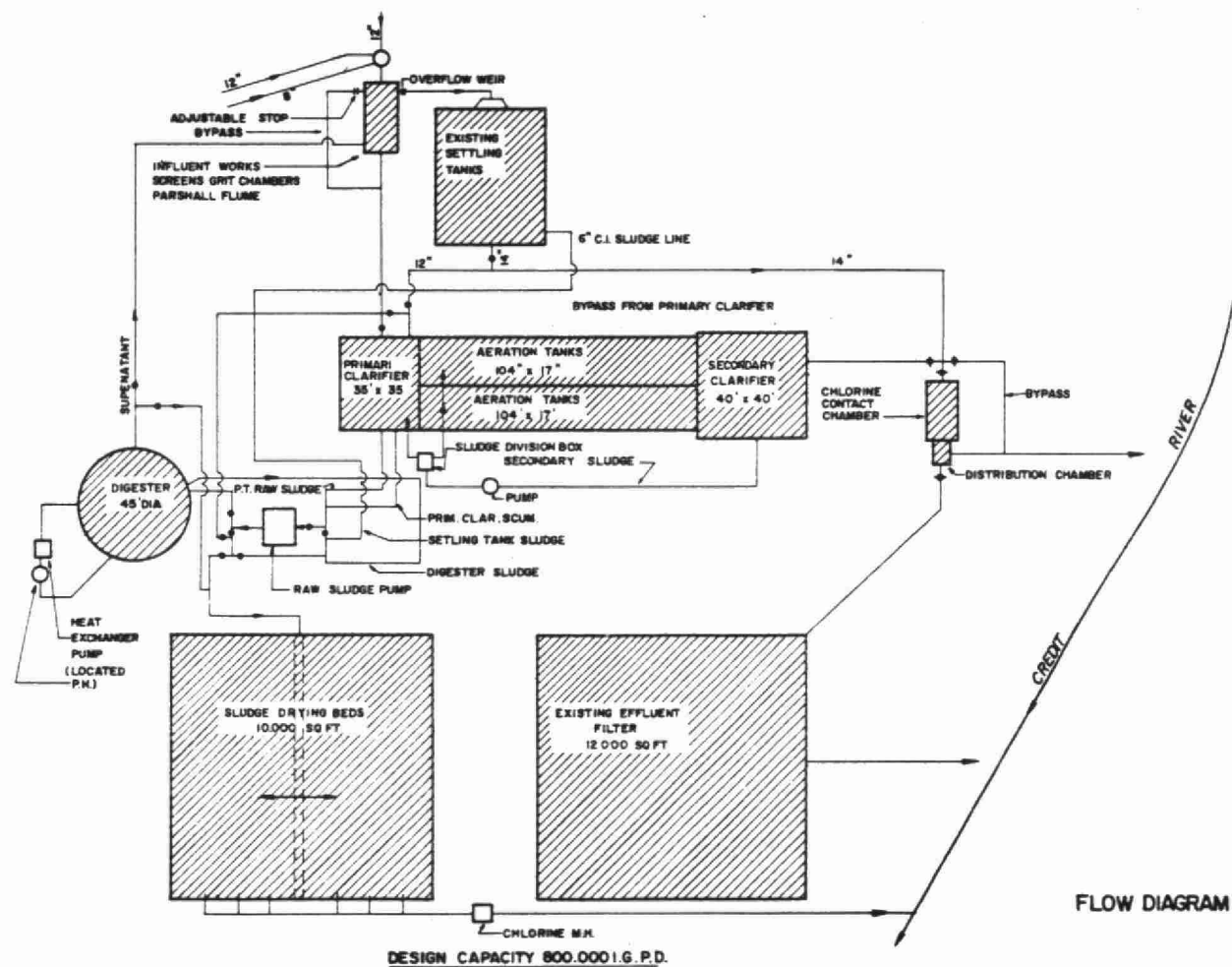
1965 OPERATING COSTS



TOTAL ANNUAL COST



***Technical
Section***



FLOW DIAGRAM

Design-Data

GENERAL

Type of Plant - Activated Sludge.

Design Population - 8,000 persons.

Design Plant Flow - 800,000 gallons per day.

Per Capita Flow - 100 gallons.

Five Day BOD -

Raw Sewage - 240 PPM

Removal - 90-95%

Suspended Solids -

Raw Sewage - 260 PPM

Removal - 90%

PRIMARY TREATMENT

Influent Sewers

Two 12 inch and one 8 inch sewer connected to the influent works by a 12 inch diameter cast iron pipe.

Screening

Two manually cleaned bar screens.

Grit Removal

Two grit removal channels, detention provided 0.43 minutes at design flow.

PRIMARY SEDIMENTATION TANK

One Dorr-Oliver-Long - 35 ft. square by 10 ft. deep.

Detention Time - 2.3 hours.

Surface Settling Rate - 650 gallons per square ft. of tank per day.

Overflow Rate - 6250 gallons per lineal ft. of weir per day.

SECONDARY TREATMENT

Aeration Tanks

Two single pass tanks each 104 ft. by 17 ft. by 12 ft.

Detention Time - 6.1 hours at design flow plus 25% return sludge.

Air Supply to Tanks - Each tank has 24 separately valved banks of general filtration and engineering's Flo Rite air diffuser assemblies (total 96).

Air Blowers - Two rotary positive blowers rated at 760 cfm each. Air supply 1.2 cubic ft. per gallon at design flow.

FINAL SEDIMENTATION

One Dorr-Oliver-Long - 40 ft. square.

Detention Time - 2.4 hours.

Surface Settling Rate - 625 gallons per square ft. of tank per day.

Overflow Rate - 5400 gallons per lineal ft. of weir per day.

DIGESTER

One Tank - 45 ft. diameter by 26 1/2 ft. liquid depth.

Capacity - 4.5 cubic ft. per capita.

Loading - 1.5 pounds solids per cubic ft. tank per month.

SLUDGE BEDS

Two beds 50 ft. by 100 ft.

Total area - 10,000 square ft.

CHLORINATION

Contact chamber providing 20 minutes detention.

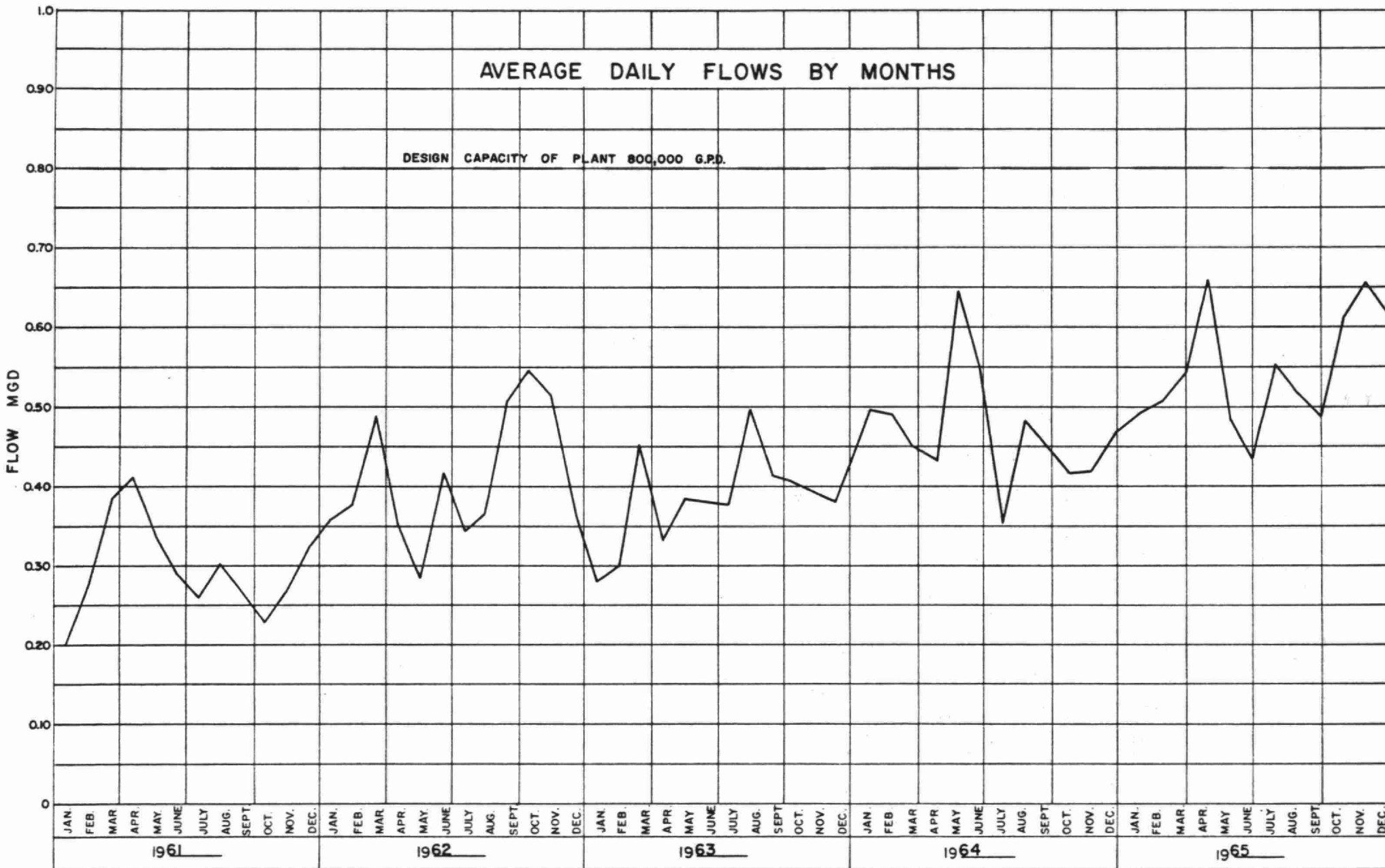
Capacity 200 pounds chlorine per 24 hours.

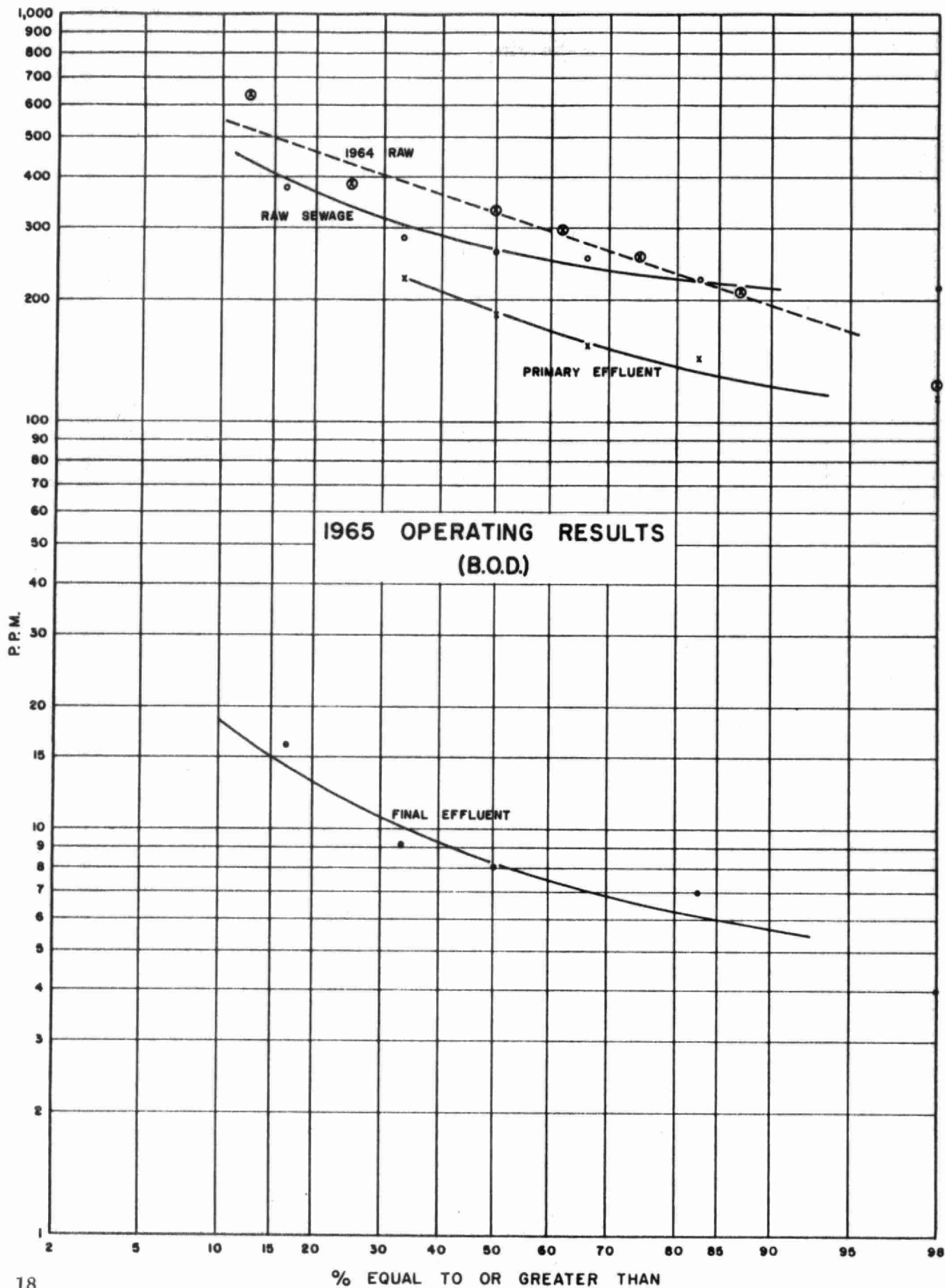
Process Data

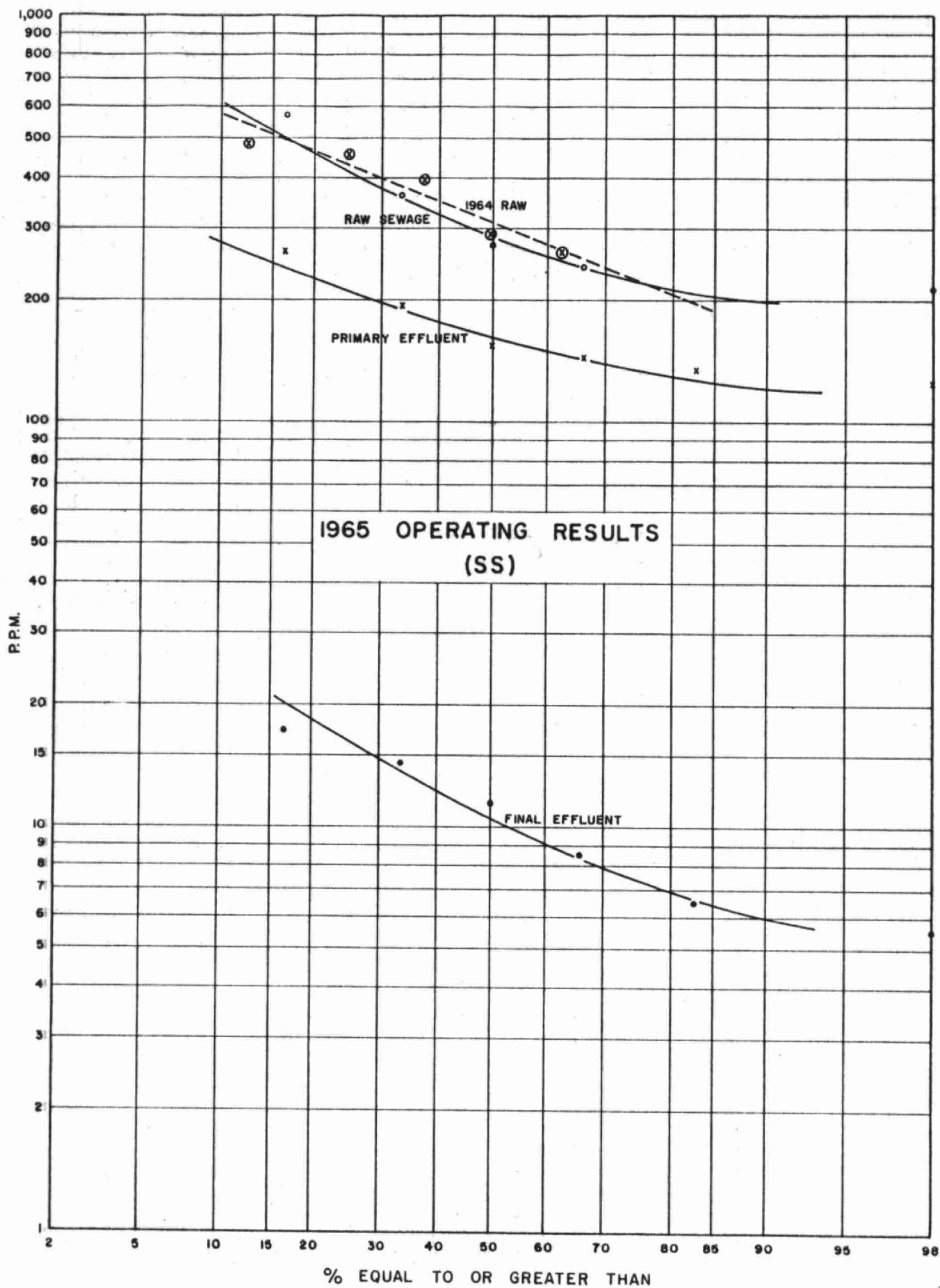
During 1965, a total of 200.1 million gallons of raw sewage was treated at the Streetsville plant. This is an increase of 16% on that treated in 1964 and represents an average daily flow of 0.55 million gallons or 69% of the hydraulic capacity of the plant. The maximum twenty-four hour flow treated in 1965 occurred during the week of October 17-23 when a flow of 1.98 million gallons was recorded.

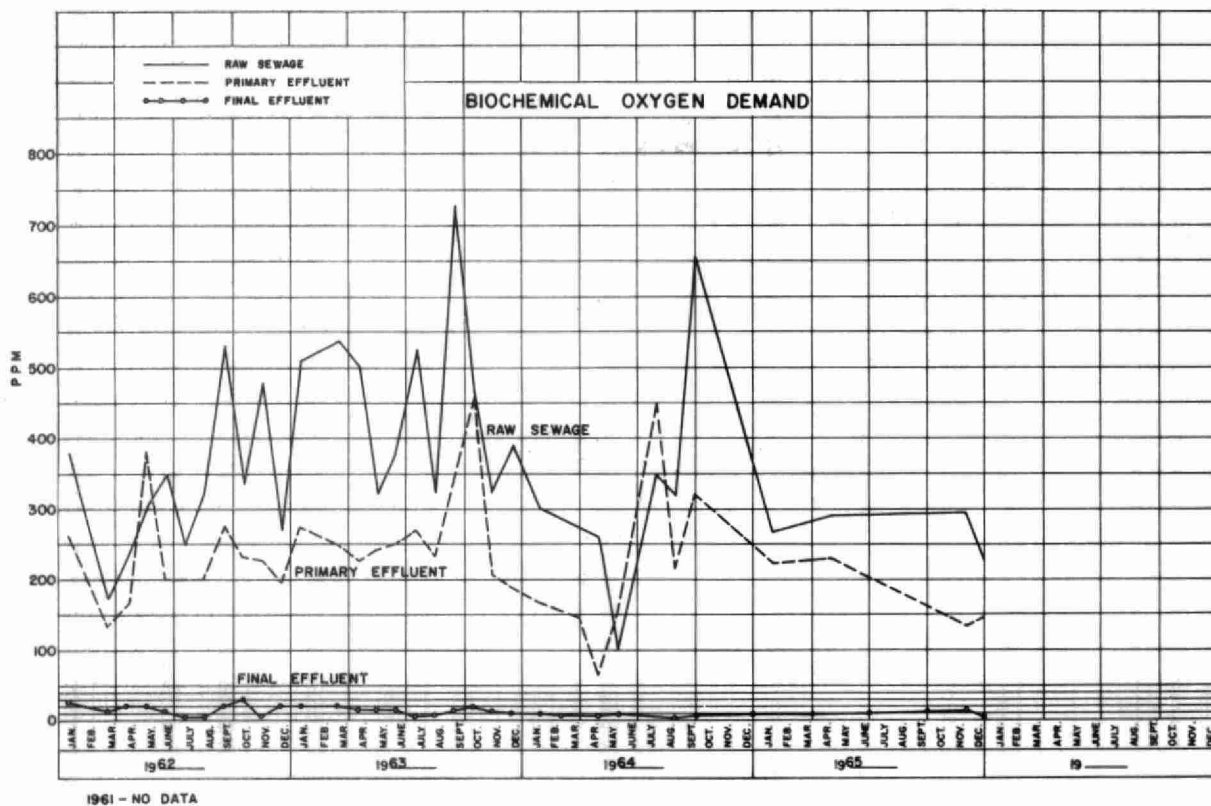
AVERAGE DAILY FLOWS BY MONTHS

DESIGN CAPACITY OF PLANT 800,000 G.P.D.

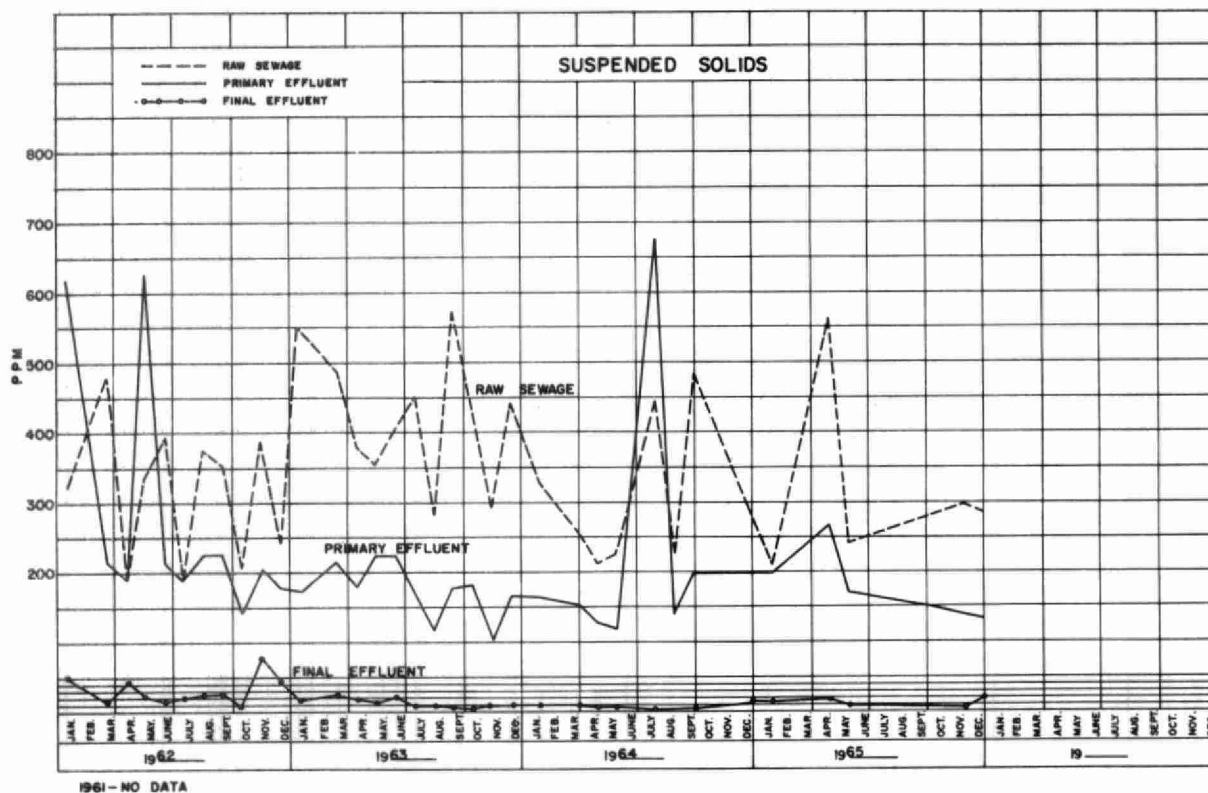








MONTHLY VARIATIONS



GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	
JAN.	265	8.4	97.0	19.6	210	12	94.0	15.1	25
FEB.	*318	9	97.0	22.0	*327	12	96.5	22.4	29
MAR.	*318	9	97.0	26.1	*327	12	96.5	26.6	27
APR.	290	9.2	97.0	27.8	562	15	97.5	54.2	22
MAY	260	7.6	97.0	18.9	240	7.6	96.0	17.3	10
JUNE	*318	9	97.0	20.0	*327	12	96.5	20.4	12
JULY	*318	9	97.0	27.0	*327	12	96.5	27.5	7
AUG.	*318	9	97.0	24.8	*327	12	96.5	25.3	15
SEPT.	*318	9	97.0	22.7	*327	12	96.5	23.1	24
OCT.	650	6.2	99.0	60.9	406	12	97.0	37.2	27
NOV.	295	6.1	98.0	28.3	295	12	96.0	27.7	39
DEC.	150	16	89.5	12.8	250	15	94.0	22.5	23
TOTAL	-	-	-	309.2	-	-	-	315.2	260
AVG.	318	9	97.0	25.8	327	12	96.5	26.3	22

* Average values substituted

COMMENTS

Sampling was temporarily halted in June 1965 when laboratory facilities were overextended. Otherwise, treatment was excellent.

AERATION TANK RESULTS

70

60

50

40

30

20

10

0

1000 LBS. BOD TO AERATION
SECTION PER MONTH

LBS. BOD / 100 LBS. MLSS

JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT. NOV. DEC. 1962

JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT. NOV. DEC. 1963

JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT. NOV. DEC. 1964

JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT. NOV. DEC. 1965

JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT. NOV. DEC. 19

1961 - NO DATA

AERATION SECTION

MONTH	PRIM. EFFL. B.O.D. PPM.	ML.SS. PPM.	LBS. BOD. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. BOD. REMOVED
JANUARY	225	1782	27	1362
FEBRUARY	-	2012	-	-
MARCH	-	1924	-	-
APRIL	230	1791	32	1156
MAY	185	1905	15	2138
JUNE	-	1919	-	-
JULY	-	1835	-	-
AUGUST	-	1994	-	-
SEPTEMBER	-	3660	-	-
OCTOBER	305	4005	18	796
NOVEMBER	134	3339	11	1594
DECEMBER	94	5859	4	2989
TOTAL	-	-	-	-
AVERAGE	196	2669	18	1672

COMMENTS

Air is supplied by fine bubble diffusion. The amount is constant and there is ample reserved as shown by the cubic feet of air per pound of BOD removed. The only time the facilities were taxed was during canning season.

DIGESTER OPERATION

Month	1000's cu. ft. to Digesters	1000's cu. ft.	
		To Beds	Removed
January	19.69	1.64	2.02
February	18.63	1.48	1.48
March	20.19	1.54	3.24
April	17.42	1.08	2.02
May	19.78	0.05	4.55
June	21.13	0.92	9.96
July	20.34	-	4.13
August	17.82	-	9.23
September	21.06	0.24	12.23
October	20.30	0.30	6.64
November	19.35	-	4.62
December	20.25	1.05	3.56
Total	235.96	8.30	63.95
Average	19.66	0.92	5.33

COMMENTS

The digester worked well and sufficient gas was produced to run the boiler most of the time.

By careful use of drying beds in winter and running of digester supernatant to the aeration section, sludge haulage costs were kept to a minimum.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	15.240	-	-
FEBRUARY	14.230	-	-
MARCH	16.869	-	-
APRIL	19.805	*119	2.00
MAY	14.978	284	1.90
JUNE	12.952	472	3.64
JULY	17.472	391	2.24
AUGUST	16.069	431	2.68
SEPTEMBER	14.668	467	3.18
OCTOBER	18.908	544	2.88
NOVEMBER	19.601	362	1.85
DECEMBER	19.143	301	1.57
TOTAL	200.115	3371	-
AVERAGE	16.676	375	2.41

* 9 days chlorination

COMMENTS

Chlorination is conducted from when the River Credit becomes ice free in spring to freeze up in late fall.

The plant used 3371 pounds of chlorine at an average dosage of 2.41 ppm to maintain a satisfactory residual.



CONCLUSIONS

Operation was normal in 1965 and a highly efficient removal of pollution was achieved.

There is a steady increase in flow, the increase in 1965 over 1964 being 16%.

Canning factories caused operational problems during the fall of 1965 due to the high strength of their wastes.

RECOMMENDATIONS

The Town of Streetsville should institute a sewer use by-law before loadings on the plant become critical.

